

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CONTOUR BUFFER STRIPS

(Acre)

CODE 332

DEFINITION

Narrow strips of permanent, herbaceous vegetative cover established across the slope and alternated down the slope with parallel, wider cropped strips.

PURPOSES

- To reduce sheet and rill erosion.
- To reduce transport of sediment and other water-borne contaminants downslope, on-site or off-site.
- To enhance wildlife habitat.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland. It is most suitable on uniform slopes ranging from 4 to 8 percent with slope lengths less than the Critical Slope Length (Critical Slope Length = length of slope above which contouring loses its effectiveness). It is also most suitable in regions where rainfall intensities are low to moderate (10 year EI less than 140). EI = storm energy * maximum 30 minute intensity. All counties in Tennessee have an EI less than 140.

This practice is not suited to fields with extremely long slopes whose length exceeds the critical slope length for contouring by more than 1.5 times, unless

the field slope length is shortened by the installation of other practices (e.g. terraces).

The practice is more difficult to establish on undulating to rolling topography because of the difficulty of maintaining parallel strip boundaries across the hill slope or staying within row grade limits.

The narrow strips of permanent vegetative cover are not a part of the normal crop rotation.

This standard does not apply to situations where the width of the buffer strips will be equal to or exceed the width of the adjoining crop strips.

CRITERIA

Criteria Applicable to Both Reducing Sheet and Rill Erosion and Reducing Transport of Sediment and Water-Borne Contaminants.

a. Row Grade, Strip Boundaries, and Baselines

The grade of the cropped strip shall be aligned as closely as possible to the contour to achieve the greatest erosion reduction possible. The maximum grade of rows within the crop strips shall not exceed 2 percent or one half of the up and down hill field slope whichever is less. Up to 3

Conservation practice standards are reviewed periodically, and updated as needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

NRCS, NHCP

March, 1999

percent row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet (i.e. grassed waterway, field border).

For crops sensitive to ponded water for periods less than 48 hours, design a positive row grade of not less than 0.2 percent from the nose of a hill or ridge toward a stable outlet.

The grade along the up slope side of the vegetated buffer shall be the same as for the cropped strip directly above it.

When the grade of any crop strip reaches the maximum allowable design grade, a new baseline shall be established up or down slope from the last buffer strip and used for the layout of the next crop strip.

b. Arrangement of Strips

Cropped strips shall be alternated with buffer strips down the hill slope. Normally, a crop strip will occupy the area at the top of the hill.

When used in combination with terraces with underground outlets, diversions, or water and sediment control basins, the layout of buffer strips shall be coordinated with the grade and spacing of the terraces so that strip boundaries will parallel terraces wherever possible. The buffer strip shall occupy the terrace or diversion berm, a channel leading to a water and sediment control basin, or lie immediately up slope of the terrace or diversion channel.

c. Stable Outlets

Surface flow from contoured crop rows must go to a stable outlet. Stable outlets include grassed waterways, underground outlets for terraces or diversions, water and sediment control basins, field borders, or similarly stabilized areas.

Additional Criteria to Reduce Sheet and Rill Erosion

a. Width of Strips

The buffer strips shall be of equal width, except when a varying width buffer strip is needed to keep either a cropped strip adjacent to it of uniform width or to maintain the strip boundary grades within the criteria set above. Width of buffer strips at their narrowest point shall be no less than 15 feet for grasses or grass legume mixtures and no less than 30 feet when legumes are used alone.

Cropped strip width shall be designed to account for some multiple of full equipment width. Cropped strips shall be of uniform width between buffer strips and not exceed the lesser of:

(1) 50 percent of the slope length (L), used for the erosion calculation, or

(2) 50 percent of the critical slope length for contour buffer strips. The critical slope length for contour buffer strips is calculated by multiplying 1.5 times the critical slope length for contour farming as determined by using approved erosion prediction technology (See Field Slope Length Limits table).

Example: If a field has a 150' slope length and a 6% slope what should the crop width be?

1) 150' slope length for erosion calculation, crop should not be > 75', a

2) 6% slope the critical slope length for contour buffer strips = 300'. Crop strip for can not be wider than 150'.

In this example considering both slope length and critical slope length the crop width must be 75' or less.

Table 1, Field Slope Length Limits

Land Slope (%)	Critical Slope Length for Contouring ^{1/}	1.5 x Critical Slope Length for Contour Buffer Strips ^{2/}	Contour Buffer Strip Width if less than half of the slope length
1 to 2	400	600	300
3 to 5	300	450	225
6 to 8	200	300	150
9 to 12 ^{3/}	120	180	90
13 to 16	80	120	60

1/ Critical Slope Length = length above which contouring losses it's effectiveness.

2/ Contour Buffer Strips are not suited to field slope lengths in excess of these limits, unless the slope length is shortened by installation of other practices (i.e. terraces).

3/ Contour Buffer Strips are most suitable on uniform slopes ranging from 4 to 8% slopes. Vegetation

Vegetation grown on buffer strips designed to reduce sheet and rill erosion shall be established to permanent vegetation consisting of grasses, legumes, or grass-legume mixtures, adapted to the site, and tolerant of the anticipated depth of sediment deposition. Plant species suitable include, but are not limited to:

Introduced Species

Tall Fescue

Peennial Ryegrass

Orchardgrass

Hairy Vetch (mixture only)

Reed Canarygrass

White clover

Bermudagrass

Crownvetch

Timothy (mixture only)

Sericea Lespedeza

Native species

Switchgrass

Virginia wildrye (mixtures only)

Canada Wildrye (mixtures only)

Native species shall not be utilized on steeper slopes when immediate cover for erosion control is needed.

No plants listed on the noxious weed list of the state will be established in a buffer strip cropping system.

The buffer strips shall have a Vegetative Cover-Management Condition of:

- 1 (established meadow - very dense cover) or
- 2 (1st year meadow or grass legume hay just before cutting) that provides protective cover and induces sediment deposition during periods when erosion is expected to occur on the cropped strips.

Cropped strips will normally be expected to have a Cover-Management Condition within the range from:

- 3 (heavy dense cover or very rough)
- Through 7 (Clean tilled, smooth or fallow). (Cover Management Conditions are described in Chapter 6, Predicting Soil Erosion by Water, A Guide to Conservation Planning with the Revised Universal soil Loss Equation "RUSLE" or Technical Guide, Section 1, Erosion Prediction)

At the end of the first growing season the stem density for introduced grass species shall be greater than 50, for native grass species, greater than 5 stems per square foot, and for legumes, greater than 30 stems per square foot.

Use the Critical Area Planting (342) standard for seeding and soil amendment recommendations.

c. Level of Erosion control

The level of erosion control achieved by the buffer strip cropping practice shall meet or exceed the soil erosion level specified by the conservation plan objective. It shall be determined using the approved erosion prediction technology,

accounting for the impact of other conservation practices in the system.

e. End Rows

On fields where row crops are a part of the rotation, keep end rows in permanent sod if their row grade would be steeper than the designed grade of the crop strip.

Additional Criteria to Reduce the Transport of Sediment and Other Water-Borne Contaminants Downslope

a. Vegetation

Buffer strips designed to reduce the transport of sediment and other water-borne contaminants shall be established to permanent close growing vegetation with stiff stems. The upper 3 to 6' may be established in stiff upright stems (i.e. native warm season grass) and the remainder of the strip in a sod forming grass (i.e. tall fescue). No plants listed on the noxious weed list of the state will be established in a buffer strip cropping system.

b. Width of Strips

On cropland having slopes exceeding 3 percent, the buffer strip width shall be based on the minimum criteria given above to reduce sheet and rill erosion. On slopes 3 percent or flatter, the width of the buffer strip shall be 15 feet or wider.

The maximum width of cropped strips between buffer strips shall be one half of the field slope length not to exceed 150 feet. Cropped strip width shall be designed to account for some multiple of full equipment width.

c. Arrangement of Strips

Buffer strips and crop strips will be alternated down the hill slope. A buffer strip will be established at the bottom of

the slope. This width of this buffer strip will be two times the width of the other buffer strips in the system.

d. End Rows

End rows shall be vegetated and have a minimum width of 15 feet between the end of the tilled strip and the field's edge.

Additional Criteria to Enhance Wildlife Habitat

To enhance wildlife habitat, native, warm season grass specie mixture, recommended for wildlife purposes, will be used where adapted.

Delay mowing the buffer strips to every other year or every third year depending upon geographical location.

Mow only after the desired species of ground nesting birds have hatched. Allow for regrowth before the growing season ends.

To enhance wildlife cover, the width of buffer strips will be increased to 30 feet or wider as determined based on the requirements for nesting and escape cover of the target wildlife species.

The maximum width between buffer strips should not exceed 300 feet.

CONSIDERATIONS

Protect areas of existing or potential concentrated flow erosion by any one or more suitable conservation practices, such as grassed waterways, water and sediment control basins, or diversion terraces.

When the slope length exceeds the critical slope length for the cover-management condition that best characterizes the field to be contour buffer stripped, establish structures, such as terraces, to reduce the slope length below critical if the soil loss

objective is not reached. Design Guidance: Critical slope lengths can be increased by retaining crop residue on the soil surface of the cultivated strips using crop residue management practices. Certain tillage practices can also be used on the cultivated strips to increase random roughness to cause deposition to occur in depressions between soil clods. However, if the cropped strips are kept very rough, in high ridges, or under heavy residue cover, the need for contour buffer strips as an erosion and sediment reduction practice will be reduced since less sediment will be delivered to them.)

On fields where row crops are a part of the rotation, consider establishing field borders on end rows, which are steeper than the designed grade of rows in the cropped strip. Where contour row curvature becomes too sharp to keep equipment aligned with rows during field operations, consider increasing the buffer strip width to avoid sharp ridge points. In drainageways, consider establishing grassed waterways at least to the point of sharp curvature. These strips should be wide enough to allow the equipment to be lifted and/or turned to meet the same rows across the turn strip.

Establish sod turn strips on sharp ridge points or other odd areas as needed where row alignment changes abruptly.

Prior to design and layout, consider removing any obstructions or making changes in field boundaries or shape, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.

Prior to layout, inspect the field's position on the landscape to find key points for commencing layout or getting the width of one set of strips (one cultivated and one buffer) to pass by an obstruction (i.e.

NRCS, NHCP

March, 1999

telephone pole) or ridge saddle.

Considering grade limits, whenever possible, run strip boundaries parallel with fence lines or other barriers. Account for uncropped access road widths when they must traverse the field by adjusting strip boundaries on either side accordingly.

Where possible layout rows perpendicular to the field border to facilitate turning equipment either direction.

Some non-noxious weedy growth may be allowed in the strips as they provide an insect source for young birds. Also, consider adding native forbs to the seeding mixture when they are available.

The standing residual cover provides early and late season nesting and escape cover for many species of wildlife displaced from other mowed areas.

PLANS AND SPECIFICATIONS

Specifications for installation, operation, and maintenance of Contour Buffer Strips shall be prepared for each field according to the Criteria, Considerations, and Operations and Maintenance described in this standard, and shall be recorded on specification sheets, job sheets, narrative statements in conservation plans, or other acceptable documentation.

Document acres, survey notes, measurements, crops or species and rotation.

OPERATION AND MAINTENANCE

Conduct all farming operations parallel to the strip boundaries. Time mowing of buffer strips to maintain appropriate vegetative density and height for optimum trapping of sediment from the upslope cropped strip during the critical erosion period(s). If wildlife enhancement is desired, delay mowing until after the

desired species of ground nesting birds has hatched approximately August 15.

Fertilize buffer strips as needed to maintain stand density.

Mow sod turn strips and waterways at least annually.

Spot seed or totally renovate buffer strip systems damaged by herbicide application after residual action of the herbicide is complete.

Redistribute sediment accumulations along the upslope edge of the buffer-crop strip interface upslope over the cultivated strip when needed to maintain uniform sheet flow along the buffer/cropped strip boundary. If sediment accumulates just below the upslope edge of the buffer strip to a depth of 6 inches or stem density falls below specified amounts in the buffer strip, relocate the buffer/cropped strip interface location. Cultivated strips and buffer strips shall be rotated so that a mature stand of protective cover is achieved in a newly established buffer strip immediately below or above the old buffer strip before removing the old buffer to plant an erosion-prone crop. Alternate repositioning of buffer strips to maintain their relative position on the hill slope.

Renovate vegetated end row area as needed to keep ground cover above 65 percent. Renovate vegetated contour buffer strips as needed to keep ground cover above 80%.